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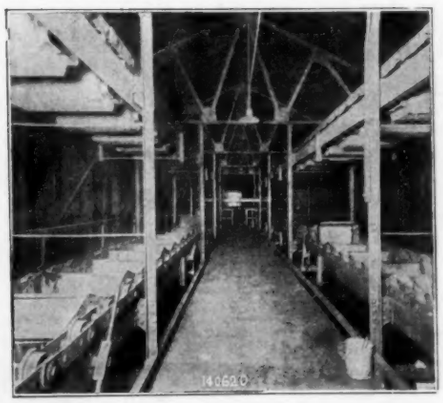
"Up, boys and at 'em!"



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THESE are the concluding words of a short uplift article by Frank Farrington, in the last issue of this journal.

Mr. Farrington tells of many failures that led to ultimate success. But only by conscientiously sticking to the main object, despite all obstacles, was this success achieved.

The future of the gas industry is dependent on the fearless men whose goal is the pre-eminence of gas for light, heat and power. The gas-makers of years gone by have set a standard for bulldog tenacity to a purpose that is ably followed by present day gas executives.

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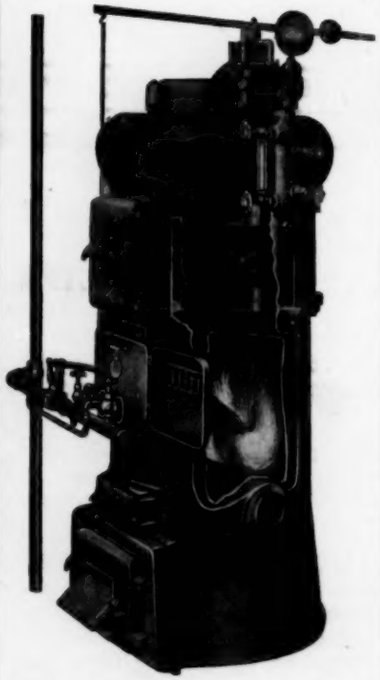
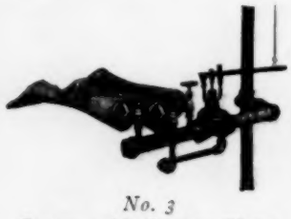


Showing Installation in Hot Water Boiler.



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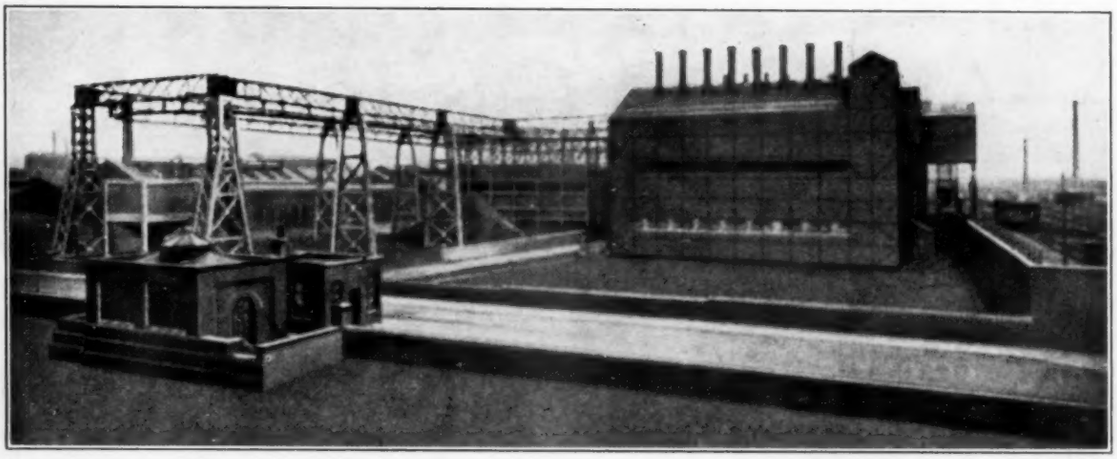

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American Gas Journal

SIXTY-FIFTH YEAR

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AMERICAN
GAS JOURNAL

Vol. 120. No. 17 NEW YORK, APRIL 26, 1924 Whole No. 3459

Educating Gas Employees

The general manager of a large gas company explains the system employed

J. D. Shattuck

General Manager, Philadelphia Suburban Gas and Electric Company

AS A preliminary to starting our educational course amongst our employees, a joint banquet was given in October, partly at the expense of the employees' association and the company. There was a very large attendance at this banquet.

At the banquet the policy of the company was outlined. Briefly our policy is that every employee should have a general knowledge of the industry in which he is engaged. He should be able to give intelligent answers to questions of our customers. A "do not know" answers causes a very unfavorable impression. Every employee who comes into direct contact with the public, from the complaint clerk. the salesman to the distribution men and meter readers, must be able to answer any ordinary question asked of them.

It was felt that if part of the study necessary to become familiar with the industry was done in the employees' time it would be of more value to the individual.

Course Open to All Employees

Every employee of the company was requested to take the course, and it was made obligatory on the part of those who come in contact with the public. The request of the company was pretty generally acceded to by the employees.

The course was started in December and so far the results have been very pleasing. Employees seem to like the course and have shown remarkable interest in it, as evidenced by their answers and the improvement in the interest they have apparently taken in their work.

There is one indirect result—our employees sold more preferred stock to customers in January than in any previous month.

A Detailed Program of the Course of Study

The subjects covered and the program is as follows:

MANUFACTURING

First—Generation of (a) coal gas, (b) water gas, (c) coke oven gas, (d) steam.

Second—Visit to gas works.

Third—(a) condensation and purification, (b) by-products, (c) chemical and physical control.

Fourth—(a) holders and governors, (b) preparation of coke, (c) sales of products.

Fifth—Visit to coke ovens.

Sixth—Review of manufacturing and answers to questions.

DISTRIBUTION

Seventh—(a) canvassing proposed, gas mains, (b) preparation for growth of territory and main capacities, (c) high and low pressure main extension and services, (d) pressures and the installation of valves and governors.

Eighth—(a) laying of mains—welding and caulking.

Ninth—(b) installation and care of mains and services, valves and governors.

Tenth—Review of distribution system and questionnaire.

Eleventh—Setting and removing meters, house governors, house piping.

Twelfth—Installation and care of appliances, general distribution work.

Thirteenth—Construction of meters.

Fourteenth—Care and testing of meters, Public Service Commission's regulation as to meters.

Fifteenth—Review of service work and questionnaire.

Sixteenth—(a) work orders, (b) consumers' accounts.

Seventeenth—Appliance sales.
Eighteenth—Gas rate and Public Service Commission.
Nineteenth—Financing and organization.
Twentieth—Review (conclusion).

Method of Conducting Course

The method of conducting the course is to have the head of a department deliver a lecture or talk on subject allotted to him. His talk is also prepared in typewritten form, a copy of which is furnished each employee. The talk is followed by demonstrations explaining every subject covered in the talk. After the lecture and the demonstration a series of questions are given to each employee.

When these answers are turned in, they are examined and at a subsequent meeting the answers are commented upon and additional information given and papers incorrectly answered are returned for correction by the employees.

Perfect answers must eventually be supplied by every employee who comes in contact with the public. The questions are not beyond the capacity of such employees, if they know their work sufficiently well to hold their jobs. These answers give a wonderful insight to the management of the ability of each man and will form a very good basis for promotion of employees.

The Employees' Association

This course is really given under the auspices of the Employees' Association, which is an association formed for education, entertainment and beneficial purposes. In these three objectives the company shares equally with the association in the benefit fund, in addition to carrying life insurance for each employee. It pays during the year more than one-half the cost of the social and entertainment features and stands one-half the time required to deliver the lectures and demonstrations.

The members are divided into two classes, lectures being given Tuesday and Thursday afternoons between the hours of 4:30 and 5:30.

The course will run about eighteen weeks.

Opportunity will be given to any employee who desires to go further into any of the technical phases of the gas business.

Analyzing Gas for Carbon Monoxide

A description of an improved device for determining this constituent in gas

A. Grebel

The percentage of carbon monoxide in gas is of importance from several standpoints. In the first place it adds to the calorific power of the fuel for carbon monoxide burns to carbon dioxide with the generation of approximately 340 B. T. U. per cubic foot. In the second place, it is the constituent of gas which controls to a large degree its poisonous properties. While there is no reason for strict control of the carbon monoxide content of gas within certain definite limits, as is carried out on the continent of Europe, particularly in France, a quick method of determining the carbon monoxide proportion in gas is of importance for other reasons. The following method and device were designed for constant and quick determinations and will interest the American gas man as a particularly ingenious form of apparatus:

Principle of the Apparatus

The apparatus is seen in the following illustration. The main feature of the apparatus is seen to be an arrangement of three burettes, which are provided with a water jacket and which are interconnected so that three simultaneous measurements can be made, entailing considerable saving in time.

The principle on which the apparatus works is simply the absorption of carbon monoxide in cuprous chloride, after the other constituents of the gas, which are also liable to be absorbed by this reagent, are first removed in some suitable manner. To accomplish this the following solutions are introduced into the burette, one after the other. These solutions are:

1. Bromine, which is used for the elimination of heavy hydrocarbons, such as ethylene, propylene, benzene, acetylene.
2. Potassium hydroxide, which is used for the removal of the carbon dioxide contained in the gas.
3. Potassium pyrogallate, which is employed for the elimination of the oxygen content of the gas.

The gas sample is shaken up with these absorbents, one after the other. The original volume of the gas is reduced from V_0 to V_1. The action of the cuprous chloride, which is the last absorbent used in the analytical process, reduces the volume still further to V_2. The percentage of carbon monoxide in the gas is then given by the formula:

$$\frac{V_1 - V_2}{V_0} \times 100.$$

*Translated from Chimie et Industrie, specially for the American Gas Journal

Care Required in Analysis

Inasmuch as the volume of carbon monoxide in the gas sample is only a few cubic centimeters, it is absolutely necessary that all the readings of volume in the burettes be made under exactly the same conditions as far as temperature, pressure and the volume of capillary spaces are concerned.

Furthermore, it is very necessary to see that the absorptions are complete in each stage of the analytical process. The directions for using the apparatus fix the quantities of the various reagents employed and the water that is introduced, as well as the number of times the reaction bulb is turned upside down. This insures sufficient agitation of the gas sample with the reagent, which agitation is the same for each step of the analysis. Inasmuch as it is very difficult to preserve a solution of potassium pyrogallate, the latter is made just before being used in the analysis by mixing together in the proper proportions a solution of potassium hydroxide and a solution of pyrogallic acid.

Description of the Apparatus

Each burette is graduated into one hundred cubic centimeters in divisions of one-quarter of a centimeter. The burette is furnished with four stopcocks and a charging funnel, E. The burette is surrounded with a glass jacket, B, through which a current of water is circulated.

The stopcocks, which are connected with the burette by capillary tubes, serve for the following purposes: Rg is used for the introduction of the gas, Rl for the introduction of the liquid reagents, Rv for removing these liquids after they have exerted their absorbing action on the gas, and Rp for reestablishing the pressure in the burette by manipulation of the manometric flask, F, which contains approximately half a liter of distilled water.

The filling device, E, consists of a cylinder, which is closed in order to permit the rotation of the same without any of the liquid being spilled out of it. To this device, as can be seen from the figure, there is soldered a funnel and a large overflow pipe. The part of the containing device, which is comprised between the valve Rl and the overflow, has a volume which is equal to about forty divisions on the burette. This volume is graduated.

Precautions to Be Taken

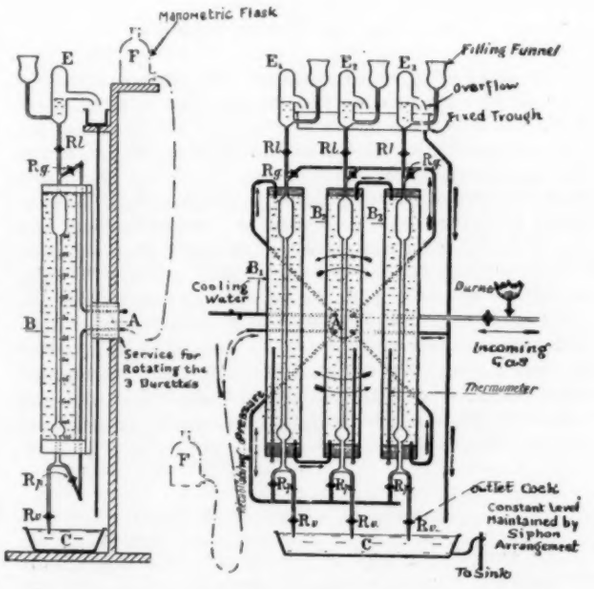
At the moment that readings are made and when the various solvents and absorbents are introduced into the apparatus, the burettes are fixed in the vertical position and the filling device is located above the burettes. In this position the liquid that is contained in the burette should fill not only the lower part of the graduated tube, but the small tubes, Rv and Rp, as well. Furthermore, it should also fill, through capillary action, the small tubes, Rg and Rl. The net result of such an arrangement is that the volume of the apparatus that is occupied by the coal gas that is being analyzed is limited to the volume of the cylinder and of the upper part of the graduated tube. Furthermore, the lower capillary extremity of the small tube, Rv, dips several millimeters below the surface of the water in a water bath which is kept at a constant level, and by capillary action it always remains filled with liquor, which prevents all entrance of air into the apparatus through this opening, when the stopcock, Rv, is opened and shut.

Reversing the Apparatus

In order to allow the entire apparatus to be turned upside down and so secure thorough mixing of the constituents of the coal gas with the absorbents, the burettes are mounted in a suitable manner on a hollow spindle, through which the various rubber tubes, carrying the water of circulation, making connection between the stopcock Rg and the flask F and stopcocks Rp are inserted, so that the gas can flow from one part of the apparatus to the other. A counter tells the number of times the apparatus is rotated.

Using the Apparatus

Before using the apparatus in making an analysis, the various passages, through which the coal gas sample circulates in its progress through the apparatus, are given a very thorough cleansing with the aid of a current of gas, which emerges from a gas jet at the rate of 200 liters per hour. Then water is started, circulating through the different



water jackets at the rate of fifty liters per hour at the very maximum. The water, which is fed from a special tank containing approximately one hundred liters of water, and located at a convenient position above the apparatus, should not be any warmer than 20 degrees C.

The distilled water which is employed in this apparatus must not contain any salts of the metal calcium. The water is tested for calcium salts by adding to a sample of the same a few drops of a 5 per cent solution of oxalate of ammonia. A precipitate or clouding of the sample must not ensue, as it indicates the presence of calcium salts in the water. The solution of potassium hydroxide, which is employed as a reagent in the apparatus, must be colorless and must possess a concentration of 20 degrees Be. Similarly, the solution of pyrogallic acid must also be colorless. The reaction tubes or bulbs, which contain cuprous chloride, should be completely filled with the solution, which ought to contain a slight excess of copper.

Filling the Burettes

After the apparatus is placed in such a position that readings of the levels of the various liquids can conveniently be carried out, the next step is to fill the burettes with distilled water. In order to do this the manometric water flask, F, is placed on the small shelf located above the apparatus and the stopcocks, Rl, Rp and Rv, are opened, one right after the other. Then the stopcock Rv is shut, as soon as water starts to run out of the open end of the tube, which is controlled by this stopcock. Then, again, the valve Rp is closed when water starts running out of the overflow funnel. As there are three such stopcocks in each burette device, the same procedure must be followed in each case.

Saturating the Water with Gas

The next step is to saturate the water which is used in the apparatus and which comes in contact with the gas during the progress of the analysis. This refers to the water in the container, E. When the apparatus is in the reading position, the pressure of water between Rg and the overflow is generally greater than the pressure under which the gas is distributed throughout the apparatus. Hence when the apparatus is tilted in such a manner so as to reduce the height of the column of water, the gas is caused to bubble through the water in the container, E. After this has been done and the water has been properly saturated with coal gas, which takes about five minutes, the stopcock Kl is closed and the apparatus is brought back again to the vertical position.

Drawing in a Sample of Gas

The sample of gas is drawn into the apparatus by opening the stopcocks Rg and Rv. The gas enters the burettes and drives the water out of them. Then, after a sufficient amount of gas has been drawn into the apparatus, the stopcock Rv is closed. This is usually done when the water reaches a level somewhere between the graduations 98 and 99. The next step is to open stopcock Rl and then to close stopcock Rg as soon as the water fills the capillary tube in which it terminates. Then the container, which holds the water used in filling the apparatus, is emptied through the valve Rv. The stopcock Rl is then closed and atmospheric pressure is established in the burettes by means of the flow of water from the manometric flask through the valve Rp. The volume Vo is then read off each burette. This volume is noted, as well as the temperature at which the reading is made, and the temperature of the water that circulates through the apparatus.

The Actual Analytical Process

At this point the analyst is ready to proceed with the actual analytical process. In order to carry out the preliminary absorption of constituents of the coal gas sample, the apparatus is filled with a solution of bromine until the level of the liquid stands at the point 40. The stopcock Rv is opened and then Rl is also opened. After the filling vessel is entirely empty of water, the stopcock Rl is closed and after that the stopcock Rv. The apparatus is then rotated. Then another quantity of bromine water (the same volume as before) is introduced into the apparatus. The latter is then rotated ten times. This insures a thorough shaking up of the gas sample with the absorbent, bromine water.

The process is then repeated in the same manner as described above, but in the place of bromine water a solution of potassium hydroxide is employed. The volume of this solution used in the analysis is the same as that of the bromine solution. In this case the apparatus is turned around five times instead of ten times as heretofore.

Then in the same way enough potassium hydroxide is introduced to fill the burette for a distance of twenty-five divisions and enough pyrogallic acid to fill it for a space of fifteen divisions. After the liquors have been introduced into burettes, the space remaining is filled with pure, distilled water. The apparatus is rotated ten times.

The next step consists in washing the burettes with a stream of distilled water before re-establishing atmospheric pressure conditions within the apparatus. The volume of gas, which is termed V_1, is read and noted, as well as the temperature of the air and of the water.

Absorption of the Carbon Monoxide in the Gas

In order to absorb the carbon monoxide that is contained in the sample of coal gas, a volume of liquor corresponding to forty divisions on the burettes is introduced into each burette in the same manner as has been described above. The reagent used in this case is cuprous chloride. The apparatus is rotated ten times. The identical operations which are described above are then repeated. Finally the burettes are washed with a stream of pure distilled water before atmospheric pressure conditions are re-established in the apparatus. The volumetric readings are noted again, this time the designation of the noted and recorded volume being V_2.

At the conclusion of the analysis, the burettes as

(Continued on page 399)

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT YOU CAN DO IT BETTER WITH GAS

Lesson No. 17

Convection of Heat

*Formula for Calculation of Heat Transmitted by Conduction

THE industrial gas engineer may be asked to determine the amount of heat that will pass through a wall or through the sides of a heating apparatus in a unit of time in calculating the quantity of gas that will have to be burnt to accomplish a certain result within the apparatus. Thus, this is a common calculation in house heating practice where it is always necessary to find the number of heat units which will be transmitted through the walls of the room or building in a hour's time. The factors that are given in the above table are used in this calculation.

It is evident that the amount of heat that will flow through a certain wall will depend on the superficial area of that wall and on the thickness of the same as well as the difference in temperature between one side of the wall and the other. It is clear that the greater the temperature difference between the inside surface and the outside surface of the wall, the greater the quantity of heat that will flow through it in the period of an hour. On the other hand, the thickness of the wall reduces the quantity of heat that will be transmitted by conduction through it, when the time factor remains constant. In other words, the quantity of heat that is conducted varies directly as the superficial area of the wall, and the difference in temperature between the inner and exterior surfaces of the same and inversely as the thickness of the wall. The formula for the quantity of heat flowing per hour of time is therefore:

$$Q = K \frac{A(t_1 - t_2)}{d}$$

in which Q is the B. T. U. per hour, A the area of the wall or other surface in square feet, t_1 the higher temperature, t_2 the lower temperature, d the thickness of the conductor in inches and K a constant dependent on the material from which the conductor or insulator is made, found in the aforementioned tabulation.

Convection, Another Mode of Transmission of Heat

It has been shown that when heat is applied to one end of a solid body, the temperature of the entire mass will gradually rise, due to the fact that heat is conducted from one particle of the solid to the next one directly in contact with it, and so on throughout its entire structure. In other words, heat is transmitted by conduction. One essential condition in the conduction of heat is that the particles of matter are in direct contact with each other. This does not mean heat will not be transmitted any way, but if it is the transmission process is not that of conduction. When standing in front of a fire, you do not come in direct contact with it, and still you feel the heat. The high temperature of the fire is being transmitted to you, even though you are not in actual contact with it.

All substances will conduct heat to a greater or lesser degree, the degree or capacity of the substance to transmit heat energy in this way being called—as has been described—the factor, or coefficient, of heat conductivity. Gases, liquids and solids all possess this property, although, to be sure, in different degrees. Solids are the best conductors of heat, liquids stand next in the list and gases come last.

Liquids and Gases Convect Heat

Liquids and gases, but not solids, convect heat as well as conduct it. The convection of heat depends on the property that liquids and gases possess of being mobile. That is, the particles of matter that constitute a mass of gas or liquid possess the power to move or can be made to move from place to place. If a certain group of such particles, due to peculiar local conditions at the point in question, possesses more heat than the remainder of the particles of the mass, it is clear that the heat in these particles will be transmitted by another means besides conduction.

In fine, to understand convection of heat, it must be remembered that the particles of liquids and gases can be made to move. Start a fan in a room and the air is violently agitated. The constituent particles move around at a lively rate. Liquids can be stirred by means of agitators, mechanically operated or manipulated by hand. The particles of the liquid are made to move from place to place, those at the bottom of the vessel in which the liquid is contained can easily be made to rise to the top and those at the top to sink to the bottom. It is evident that the particles of a solid cannot be made to move in a

*This formula was omitted from Lesson No. 16. It should be inserted just ahead of the paragraph entitled "Use of Formula."

similar manner by ordinary means. If, then, particular particles of the liquid or the gas possess a greater amount of heat energy than the rest of the mass of liquid or gas, the excess heat may be moved from the point at which it is originally located to other parts of the liquid or solid. It is clear that this is an entirely different mode of heat transmission than what takes place when heat is conducted from one particle of a substance to another by direct contact. In this case there is absolutely no movement of the particles themselves.

Water Gas Holder Makes Its Appearance In U. S.

A new type originally perfected in Germany

A NEW type of gas holder—the first one of its kind ever erected in America—will be built in Michigan City, Ind., this year by the Northern Indiana Gas & Electric Company.

This innovation in gas holders is what is known as a "waterless" holder, no water being used to seal the holder, as is the practice in the type used universally in this country and everywhere else prior to the time this new design was perfected. This new type of holder has been developed in Germany, the first one being erected in that country in 1915.

The type of construction is radically different from the holders in general use. Instead of sliding up and down in a huge steel frame as other holders do, this new style of holder remains stationary and a steel piston inside the shell ascends and descends as the amount of gas in the holder varies.

Construction of this new type of holder will make Michigan City the mecca of many engineers and representatives of gas companies from all parts of the United States and Canada this summer and fall. Construction work will start at once, the contract having been awarded to the Bartlett-Hayward Company of Baltimore, Md. It will be ready for use this fall.

One Million Foot Capacity

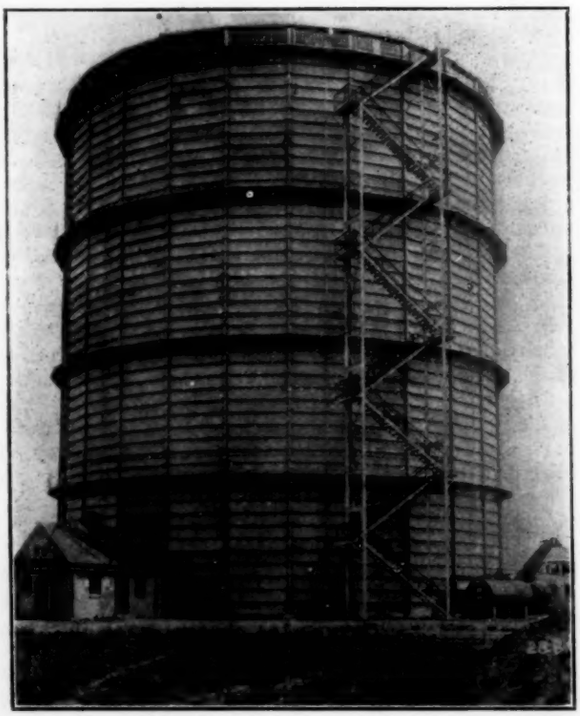
The new holder will have a capacity of 1,000,000 cubic feet of gas and will cost approximately $150,000. It will be 105 feet in diameter and 160 feet in height.

The new holder will give Michigan City storage capacity seven times as great as at present, thus assuring the city of an adequate reserve at all times and also permit the expansion of the company's gas business, which is increasing rapidly.

Provision is also made for enlargement of the holder should additional capacity be needed at some future time. An additional 50 feet in height may be added to the top of the holder, bringing its total height up to 210 feet and its capacity up to 1,350,000 cubic feet.

Forty-six holders of this new type are now in use in Germany, France and Holland. Twenty-one were erected last year. Many others are now under construction, including one with a capacity of 4,200,000 cubic feet for the Stinnes Corporation in connection with their great steel mills at Essen

The appearance of the new holder will be entirely different from the holders now in use. There will be no outer framework. The holder will be built of



plates of steel twenty feet long and thirty-two inches high. These will be riveted and welded together, making a solid steel shell.

(Continued on page 399)

As The Journal Views It

LIGHTING BY GAS

The average gas man who has not made or has not had the opportunity to make an intensive study of the lighting field, is commonly of the opinion that as far as gas is concerned the time is past when the latter can be seriously considered as a contender therein.

It is generally believed that there is no future for gas as an illuminant; that electricity has made such progress along these lines that it is really foolhardy to try to combat its influence. There is no question but that electricity has deprived gas of the major part of the lighting business. There is also no reason to deny the fact that electricity possesses certain advantages over gas as an illuminant. But there is equally no good reason why the gas man should think and believe that gas no longer has any advantages as an illuminant over electricity.

The gas man who is inclined to believe that the battle is lost is wrong. Has he forgotten that gas possesses quite a few important advantages over electricity as an illuminant? This may be surprising to some, but nevertheless it is true. How many know, for example, that some of the most successful and most influential lawyers, writers and other professional men who have to do a great deal of reading by artificial light, prefer and in fact insist upon having gas illumination instead of electricity?

What is the reason for this? Simply that the mellow light given by gas is much less tiring on the eyes than the bright, dazzling light that comes from the extremely high candle-power, incandescent, electric light bulb.

This is only one example of the superiority of gas for lighting purposes over electricity. It is merely cited to show that there are real arguments which can well be used to further the cause of gas as an illuminant in competition with electricity.

It may also be surprising to learn that one of the largest gas companies in the United States did a business last year in the amount of over three quarters of a million dollars in gas lighting fixtures and equipment. There is still lighting business to be obtained, and perhaps this is particularly true in the field of street lighting rather than in domestic household lighting, not that there are no opportunities still left in the latter field.

From the standpoint of an illuminant for the lighting of streets, stores, theaters, assembly halls and large structures, in which crowds of people gather at times, gas possesses a distinct advantage over electricity in that it never fails. There is always gas when you open the cock; it is always there, ready to be used, and there can never happen what has taken place a number of times in the case of electricity.

What is referred to is the sudden shutting down of the electric plant, without the slightest premonition, plunging crowded theaters and stores into utter darkness. Such occurrences have taken place in various communities where electricity is the only medium of light. Streets have been darkened without the slightest warning that such an event was about to take place. Not the least of the discomforts and dangers attendant thereon is the chance afforded holdup men and light-fingered gentry to ply their trades.

Only the other day, in the city of New York, electricity failed in a certain section, with the result that storekeepers had to close their shops for an extended period, practically for the night. It is known from actual observation that in a certain suburb of the city, where the electrical equipment is not of the highest standard, lights go out regularly half a dozen times during the summer whenever there is an electric storm, and as practically all of the houses are lighted only with electricity, they remain dark until the current is turned on again. Perforce, recourse is had to the ancient predecessor of gas, the old paraffine candle!

Another disadvantage of electricity is that any installation may suddenly get out of order. The fuse may blow out, and the house or structure is imme-

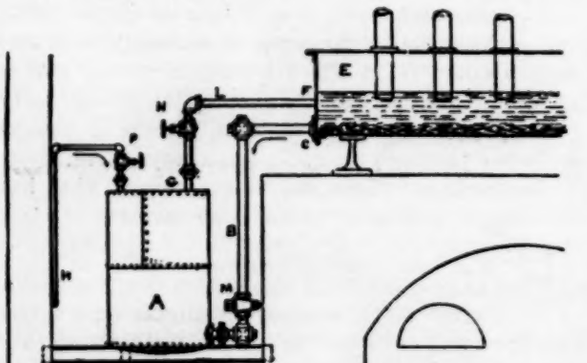
GAS WRINKLES

Removing Tar From Hydraulic Main

THE cut shows a device for the automatic removal of tar from the hydraulic main. The arrangement, while not a new one, is so simple in construction and so effective in action that we deem it worthy the attention of those who have no similar device for the purpose.

A tank A is located at some point below the level of the hydraulic main E. A convenient setting is the one shown, viz., the tank resting on two supports set in the end walls of the bench stack and the retort house, spanning the open space usually there found.

The bottom of the tank is connected to the bottom



of the hydraulic main by a 2-inch, 2½-inch or 3-inch tar pipe B, fitted with a cock M. In this pipes crossed with plugs for cleaning should be used in place of elbows.

From the top G of the tank A a 1½-inch water pipe L fitted with valve N, runs to the hydraulic main, entering a little below the regular water line at F.

Both of these pipes, B and C, are in addition to and entirely independent of the regular water supply, the overflow, and the tar take-off pipes already in the hydraulic.

The tank A is fitted with a water supply pipe H (with valve P) entering at the top and a tar draw-off pipe and cock J at the bottom.

Assuming everything tight and ready for operation, and all valves shut, the working of the device is as follows:

The tank A is first filled full of water from the pipe H and the valve P is closed. Valves M and N are then opened, giving free communication with the main. As tar is condensed in the hydraulic it settles to the bottom and finds its way through the pipe B into the tank A and displaces an equal bulk of the water in the tank, driving it out at the top, through the pipe L into the hydraulic.

This is all there is to it. Gravity draws the tar out, and fresh water replaces it in the hydraulic, thus maintaining a uniform level.

When it is desired to empty the tank A the valves M and N are closed, P opened, and the tar is drawn off at J. The water entering from H helps to force it out, and replaces it in bulk so that the water level in the hydraulic is not affected. Closing P and opening M and N puts the device again in operation.

The tank A should be large enough to easily hold a half day's make of tar, and the tar should be drawn off once a shift. Pipe J may lead direct to tar well or to barrels placed beneath.

The advantages of the scheme are that as no tar can accumulate in the hydraulic a comparatively clean water well is maintained, thus minimizing back pressure, and trouble from tar baking in the main is largely avoided.

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diately cast into darkness, and unless there is another source of illumination available it remains so until the electric light system has been repaired. Only the other day this very thing happened in the night court in the City of New York. The magistrate, with great presence of mind, called out to the police to take hold of their prisoners and retain them by their sides until the lights went on again.

Here is a great chance for gas, even if it has to be installed as an auxiliary system. For, once its advantages are again realized, it may well be that it can regain part of the great lighting business that it originally relinquished to electricity. The game is by no means lost, although it may appear so on the surface. The wide-awake, progressive gas company can take advantage of the defects of electricity in developing its gas lighting business. It is up to the gas industry to get after this business, and if they make a real, determined effort to get it back, there is no reason why they should not succeed.

The Tar Industry*

A general review of the industry and its connection with the gas business

James H. Readio

Vice-President Tar Products Company, Providence, Rhode Island

IN 1911 a paper by Whittaker entitled "Tar and Tar Products," describing the tar plant of the Atlanta Gas Light Company of Atlanta, Georgia, was read before the American Gas Institute. So far as the writer knows, this is the only paper ever read before the gas profession describing the tar industry.

To the gas man, a paper on this subject should be of dual interest; first particularly because it deals with an allied and a dependent industry, and secondly because there is hardly a phase of our social activities not dependent directly or indirectly upon some product obtained from tar.

The Importance of Tar By-Products

The World War was instigated by a nation, striving by development of metallurgical and associated products, including coal tar drugs, chemicals, dyestuffs, explosives, etc., for commercial supremacy; and, by a peculiar anomaly of fate, was only ended when the Allied nations, thrown suddenly upon their own resources and initiative, finally developed these very products to a quality and quantity production in excess of that produced by Germany. Explosives used in munition manufacture, in agriculture, engineering development, irrigation and mining, are largely made from coal tar products. Miles and miles of permanent tar bound highways radiating from our industrial centers and connecting all parts of the country serve as arteries for the streams of commerce and transportation. Fertilizers, dyestuffs, drugs, including the well known "Asperin," photographic developers, rubber substitutes, paints and varnishes, tanning material for leathers, artificial leathers, flavoring extracts, perfumes, disinfectants, printing inks, amber and horn substitutes, wood preservatives, motor fuels, flotation oils, soap, moth preventatives, material for lens grinding, automobile brake linings, linoleum and oil cloths, electrical insulators and binders, building materials, and thousands of other products are now derived extensively from coal tar products.

Much has been written about the glamour and romance of the coal tar industry. The intensive development of this industry, however, is based upon a little over 5 per cent of the tar and about half of 1 per cent of the coal, and the less romantic refining and commercial disposal of the other 95 per cent of the tar is the only phase of the tar industry to be discussed in this paper.

If the refiner can show the producer how to enhance the value of his tar and enable him to create additional residual credit, both parties are mutually benefited. To do this, it will also be necessary to show briefly what happens to the tar after removal from his works, how it is handled and distilled, and what use is made of the crude derivatives.

Tars Used in Tar Industry

The tar industry of today, however, is based almost exclusively upon tars from the following general classifications:

1. Gas Works.
   - A. Water Gas Tars.
   - B. Horizontal Retort Tars.
   - C. Inclined Retort Tars.
   - D. Vertical Retort Tars.
2. Coke Ovens.

With the steel industry and by-product coke ovens operating at normal capacity, the latter source furnishes from 75 to 85 per cent of the total tar porduced in the United States.

Characteristics of Various Tars

Water gas tars are generally characterized by a brownish color, a peculiar oily odor, relatively low gravities and low carbon content, high oil yield upon distillation, small amounts of naphthalene and little, if any, phenols.

Horizontal retort tar is usually very viscous, high in gravity, free carbon and naphthalene, and low in oil yield and phenols.

Vertical retort tar is the other extreme. It is usually low in viscosity, specific gravity, free carbon and naphthalene content and high in oil yield and phenols.

Inclined tars have characteristics between horizontal and vertical tars. In general it will be noted that in high temperature carbonization, as for example in thinly charged horizontals where the gases after evolution pass into a hotter zone and come into intimate and prolonged contact with the incandescent walls of the retort, the hydrocarbon vapors and phenols are "cracked" into naphthalene, anthracene and free carbon. At the other extreme are the vertical retort tars, and more especially the continuous verticals, where the gases, as evolved at relatively low temperatures, are drawn through cooler zones,

*From an address delivered at the annual meeting of the New England Association of Gas Engineers, Boston, Mass., February 13 and 14, 1924.

without being subjected to any degrading or "cracking" effects.

Coke oven tars have characteristics peculiar to none of the other tars. They are usually comparatively low in viscosity and free carbon, but in other respects more nearly like an inclined retort tar.

No Tar Is Ideal

There is no ideal tar, that is: a tar suitable for all purposes. On the contrary, it is one of the perversities of the tar industry that a tar which will yield certain valuable products has invariably associated with it other undesirable features which nullify its value. For example, the acid oil fraction is at the moment one of the most valuable fractions to be distilled from coal tar. It is used for the manufacture of disinfectants and for the preparation of phenol and cresylic acids and is protected from foreign competition by an import tax based on Ameriean valuation. Vertical retort tar upon distillation yields a higher percentage of high acid oil than any other type and in addition contains relatively small amounts of naphthalene to be removed. This oil, however, is usually associated with small amounts of rosalic acid which is not easily removed by ordinary refining methods, and when the oil is made up into a disinfectant it produces a pink emulsion, which, although just as effective, cannot be sold to a trade already educated to a white emulsion and prejudiced against any other color. Furthermore, unless the material in the still is run to a coke, which is not the customary practice, the 60 to 70 per cent of remaining roofing pitch cannot always be marketed because of the low carbon content. Without attempting to discuss the relative merits of high or low carbon pitch, there seems to be a trade preference for the high carbon material. Hence, in order to get an equitable and average price for the various distillation products, the refiner is compelled to have several types of tars for blending purposes, and in blending he invariably pulls down certain desirable features and builds up other undesirable ones.

Impossible to Set Value on Tar

It will be readily seen that it is practically impossible to set an arbitrary or relative value upon any type of tar. While the producers within certain limits may control the quality of their tars, there is no particular financial incentive to do so, and in view of this fact it is folly to suggest that the type of carbonizing equipment be determined by the quality of the residual tar.

Necessary to Produce Relatively Dry Tar

One point upon which special emphasis should be laid, however, is the necessity for producing a relatively dry tar regardless of other characteristics. This feature can be controlled by the producer, and does affect the value of his product. The refiner cannot use, and will not purchase, either coal or water gas tar of high water content. In the first place, he is furnishing transportation facilities, and paying transportation charges on a useless diluent, and, in the second place, he is compelled to remove the excess water by some means or other before attempting to distill. Excess water causes "bumping" or frothing in the stills, decreases operating capacity, and increases fuel, labor and overhead charges.

The producer who does not properly dehydrate his tar loses not only the proportionate freight charges, but also the equivalent cost incurred by the refiner in so doing. Water gas tar should be dehydrated to not over 5 per cent water, and coal tar to not over 2 per cent water before being shipped out of the gas works.

Oscillating Dehydration

There is one method of dehydration which has come under the writer's observation and which to his knowledge has never been discussed. It might be characterized as "oscillating dehydration" and was first observed when tank cars of relatively dry tar were shipped over the rails for a considerable distance in warm weather. Such tars, after a trip of this kind, will invariably show a layer of supernatant water with a very dry tar underneath.

If an enterprising gas engineer would invent a machine to imitate the shuddering antics of a well known type of automobile when the foot brake is suddenly applied, he would evolve a very efficient tar dehydration machine.

Use of Tar Derivatives

The simplest purpose for which tar may be used is as a liquid fuel. The B. T. U. per pound of water gas tar varies from 16,000 to 18,000, as against approximately the same for fuel oil. Fuel oil, however, weighs only 7½ pounds per gallon, whereas tar weighs 9½ pounds, an increase of 2 pounds, or 25 per cent, more heat units per gallon. Most of the burners suitable for fuel oil combustion will handle tar.

Road Tars

A large percentage of the tars produced are used for road building and maintenance purposes and are divided into the following general classifications:

1. Dust Layers.
   Thin tars, or tar and oil mixtures.
2. Cold Application.
   Dehydrated and blended tars to be applied cold for maintenance work.

(Continued on page 400)

Catechism of Central Station Gas Engineering in the United States

Installment No. 17

(Continued from last week)

The Continuous System

In the continuous system, a still similar to that employed for concentrating liquor is used, and the ammoniacal liquor is treated with steam and milk of lime as when it is to be concentrated. The gas escaping from the stills passes first through a baffle box for the removal of moisture, and then into the saturator as in the intermittent system. The waste gases from the saturator pass into the liquor heaters and impart their heat to the liquor flowing into the still, after which they are either burned, or absorbed by iron oxide as in the intermittent system.

The continuous system is more economical, since the greater part of the heat in the waste gases is recovered, but the apparatus necessary is not as simple as that employed in the intermittent system.

Calculation of Yield of Sulphate of Ammonia from Ammonia

88. Five pounds of ammonia gas, NH_3, are produced by, and collected in the ammoniacal liquor resulting from the carbonization of a net ton of coal, and this liquor is used for the manufacture of sulphate of ammonia with a loss of 5 per cent in the process of manufacture. How much dry sulphate of ammonia will it yield, and how much pure sulphuric acid will be used in the operation, assuming no waste of acid? Give your calculations.

Ans. Since 5 per cent of the ammonia is lost in the process of manufacture the amount of ammonia converted into sulphate is 95 per cent of 5 lb. or 4.75 lb. The formula of sulphate of ammonia is $(NH_4)_2SO_4$ or two molecules of ammonia gas, NH_3, unite with one molecule of sulphuric acid, H_2SO_4. A molecule of ammonia gas being composed of 1 atom of nitrogen and 3 atoms of hydrogen, and the atomic weight of nitrogen being 14, and that of hydrogen being 1, the atomic weight of a molecule of ammonia gas is—nitrogen, 14; hydrogen, 3, total 17. The atomic weight of 2 molecules is therefore 34. The atomic weight of hydrogen being 1, that of sulphur 32, and that of oxygen 16, sulphuric acid, being a combination of 2 atoms of hydrogen, 1 atom of sulphur and 4 atoms of oxygen, has an atomic weight of 98, and the atomic weight of sulphate of ammonia will be $98 + 34 = 132$. Therefore, 34 lb. of ammonia combine with 98 lb. of sulphuric acid to form 132 lb. of sulphate of ammonia, and 34/132 of sulphate of ammonia, or 25.75 per cent, will be ammonia gas. Since 34 lb. of ammonia, combined with sulphuric acid, will produce 132 lb. of sulphate of ammonia, 4.75 lb. of ammonia gas will, combined with sulphuric acid, form $\frac{132 \times 4.75}{34} = 18.44$ lb. of ammonia sulphate. Of this 4.75 lb. being formed of ammonia gas, the remainder, or 13.69 lb., is formed of sulphuric acid. The percentage of ammonia gas in pure sulphate of ammonia is 25.75 by weight. We may, therefore, prove our problem by multiplying 18.44 by 0.2575, which gives us 4.748, or within 0.002 lb. of the 4.75 lb. of ammonia gas with which we started our problem. The slight difference is due to our not having carried the decimals in our divisions further than the second place.

Deterioration of Coke

89. Does coke deteriorate while stored? If so, why, and how?

Ans. Coke when stored crumbles from exposure to rain and frost, and from the crushing effect of its own weight, to fine particles of less value. The fine particles or dust are called "breeze" and for fuel purposes are of less value than the lumps.

Difference Between Gas House Coke and Oven Coke

90. What is the difference in general character between gas house coke and oven coke, and, in general terms, how is each made?

Ans. "Gas house coke is made as a by-product in the manufacture of coal gas, and is that portion of the charge remaining in the retorts after the gas has been driven off.

"There are various forms of ovens used in making oven coke, but that known as the 'bee-hive' oven is by far the most generally employed. As its name implies, the interior of this oven is dome-shaped, precisely like a bee-hive, and is generally built from 11 to 12 feet in diameter, and from 5 to 6 feet in height. The working is very simple, depending on the principle that the heat necessary for the coking of the charge is supplied by the combustion in the oven itself of a portion of the escaping gases and more or less of the fixed carbon of the charge. The coal is dumped through an opening in the crown of the oven, and spread evenly on the floor to an average depth of about 2 feet. The front opening through which the coke is discharged is at first nearly closed with brick, luted with loam. The heat of the oven from the previous coking fires the charge, and as the coking progresses the air is more and more shut off by luting the openings and finally closing the roof openings. The average charge is 7,600 lb., and the time of coking is 48 hours, with 72 hours for that burned over Sunday. When the coke is thoroughly

burned, the door is removed, and the coke is cooled by water thrown in from a hose, and then drawn.

Gas House Coke

"Gas house coke is comparatively soft and friable, due chiefly to the short time occupied in burning off the charge—from 4 to 6 hours—also to the lower temperature of carbonization, whereby the volatile constituents of the coal have not been driven off as completely as in oven coke.

"Oven coke is porous in structure, but very hard, with a metallic ring and a bright silvery-gray lustre."

Oven coke is also made in ovens designed to enable the operator to utilize the gas, tar and ammonia produced.

Value of Tar as Fuel for Heating Benches

91. With a good market for coke at 18c per hundred pounds, what is the value of tar as a fuel for heating retort benches?

Ans. The advisability of using tar to replace coke as the fuel for retort benches when the market for tar was poor and that for coke good, has been frequently discussed at the meetings of the various gas associations, but in only a few cases have definite figures been given as to the amount of tar required to do the same work as a given amount of coke, and the figures given vary somewhat from each other. In a discussion at the meeting of the American Gas Light Association, held October 18, 1876, Mr. Chas. H. Nettleton stated that experiments he had made showed that 2.6 gallons of coal-tar were equal to one bushel of coke for heating retorts, and Mr. W. H. Pearson said that he considered 2.5 gallons as the equivalent of a bushel of coke for this purpose, while according to Mr. Chas. Nettleton only 2 gallons were required to do the work of a bushel of coke. These figures were for direct-fire benches. In 1899 Mr. F. C. Sherman told the New England Association of Gas Engineers that in half-depth (semi-recuperative) furnaces he was using 200 gallons of tar (presumably coal-tar) to replace 72 bushels of coke, or 2.76 gallons for each bushel. In 1901 the same authority said that 150 gallons of water-gas tar (oil-tar) were equivalent to 66 bushels of coke, or 2.27 gallons for each bushel.

It is therefore safe to take 2.5 gallons of coal-tar as being a fair equivalent in actual working for one bushel of coke as bench fuel. A bushel of coke taken just as it comes from the retorts will weigh on an average 38 lb. If coke is worth 18c per 100 lb., one bushel weighing 38 lb. will be worth $\frac{18}{100} \times 38 =$ 6.84c, and therefore the equivalent value of tar will be $\frac{6.84}{2.5} =$ 2.74c per gallon. If 2.27 gallons of tar are taken as being able to do the work of one bushel of coke, then the tar, whether coal-tar or water-gas tar, is worth, with coke at 18c per 100 lb., $\frac{6.84}{2.27}$ = 3.01c per gallon.

While figures obtained from experiments on the heating of boilers are probably not strictly applicable to bench heating, they may be used as a check on the figures given above. Mr. C. F. Prichard, in a paper on the Fuel Value of Residuals, read before the American Gas Light Association in October, 1921 (see Proceedings of the Association, Vol. XVIII, page 77; American Gas Light Journal, Vol. LXXV, page 807, and Progressive Age, Vol. XIX, page 517), gives the equivalent values of coke, coal-tar and water-gas tar for boiler fuel as $3.75 per ton (2,000 lb.) of coke, $1.17 per barrel (50 gallons) of coal-tar, and $1.39 per barrel of water-gas tar. With coke at 18c per 100 lb., or $3.60 per 2,000 lb., the values of 50 gallons of coal-tar and of the same amount of water-gas tar would be $\frac{1.17 \times 3.60}{3.75} =$ $1.12 and $\frac{1.39 \times 3.60}{3.75} =$ $1.33, respectively, or 2.5c and 2.96c per gallon. Mr. Prichard stated that the experiments from which the value of the coal-tar was determined were not entirely satisfactory, and he thought that the true value per gallon was practically the same as that of water-gas tar.

According to these figures the relative value of the tar as compared with coke is a little lower when it is used as boiler fuel than when used as bench fuel, but the difference is not very large, and the two sets of experiments seem to check each other fairly closely.

Part 2. Distinctively Carbureted Water Gas

Difference Between Types of Generators

92. Two distinct types of apparatus, which may be called the generator-superheater and the generator-retort types, respectively, are used for the manufacture of carbureted water gas. How do they differ from each other and which is the most extensively used at the present time?

Ans. The essential difference between the generator-superheater and the generator-retort types lies in the method employed to produce the oil gas necessary to carburet the water gas, this water gas being in each case made in a generator, or, as it is also sometimes called, a cupola or gasogene.

The Generator Superheater

In the generator-superheater apparatus, which is the type most commonly used, the oil gas required for carbureting is made in the presence of the water gas in one or more vessels connected directly to the generator and lined with fire clay blocks and filled

with a checker work of fire brick piled in such a way as to afford channels through which the mixture of oil vapors and water gas passes—not in a direct course, but with frequent changes of direction produced by laying the brick in any course at right angles to those in the courses next to it, and over the spaces left between those in the courses parallel and next but one to it. Two such vessels are usually employed, the first being called the carbureter and the second the superheater. During the "blow" the checker bricks are heated by the combustion in the spaces between them of the producer gas formed in the generator. During the "run" the oil is introduced in the top of the carbureter in the form of a spray, which is rapidly vaporized, and these vapors are picked up by the water gas as it comes into the carbureter from the generator and carried through the checker work in both the carbureter and the superheater, being converted by this exposure to heat into a "fixed" or permanent oil gas, which carburets, that is, gives illuminating power to the water gas.

Generator Retort Type

In the generator-retort type the water-gas generator is entirely separate from the carbureted portion of the apparatus, which consists of a carbureter and one or more retorts. The water gas made in the generator is taken into a relief holder and then passed into the carbureter. This is usually a rectangular iron vessel in which are a number of shallow pans set on a slight incline. These pans are fastened on one end and both sides to the shell of the carbureter, an open space being left at the other end, and each pan is inclined in the contrary direction to, and has the open space opposite the closed ends of, the pans immediately above and below it. Under each pan is a steam coal. The naphtha used for carbureting is introduced at the top of the carbureter, falls on the first pan, flows down it and overflows from the open end on to the pan next below, and so on, being vaporized by the heat given out by the steam coals. The water gas, also introduced at the top, travels back and forth over the pans, picking up the naphtha vapor, and passes out at the bottom charged with this vapor. The temperature in the carbureter must be maintained at a point sufficiently high to vaporize all the naphtha before it reaches the bottom. The mixture of water gas and naphtha vapor passes from the carbureter into externally heated "through" retorts similar, in construction and the arrangements by which they are heated, to coal gas retorts, and in passing through these retorts the vapors are converted by exposure to heat into a permanent oil gas.

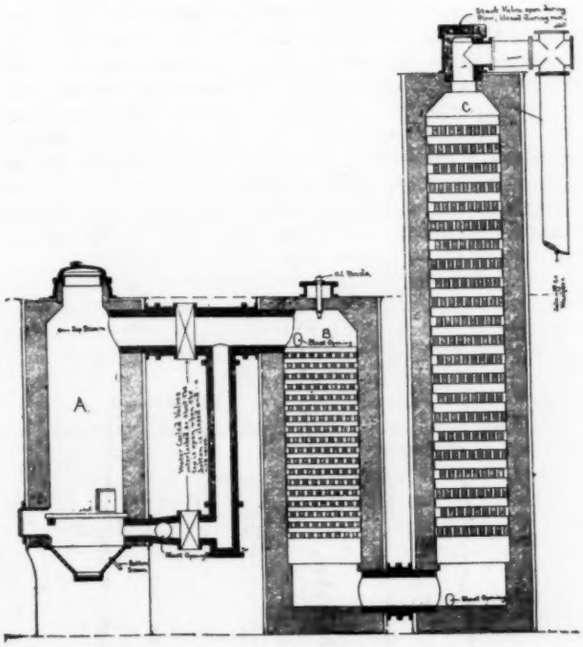
When Carbureter Is Omitted

When heavy oil is used for carbureting the water gas the carbureter is omitted, since it would be impossible to maintain it at a temperature sufficiently high to vaporize such oil, and the oil is introduced directly in the retort, usually passing first into a pipe that carries it from the gas outlet end of the retort almost to the inlet end. In its passage through this pipe it is vaporized and the vapors issuing from the open end mix with the water gas and travel back through the retort, being converted by the heat into a permanent gas. Heavy oil cannot, however, be used to the best advantage in this form of apparatus, which was especially designed for the use of naphtha.

Double Superheater Lowe Carbureted Water Gas Apparatus

93. Describe the construction of a double superheater Lowe carbureted water-gas apparatus, illustrating the description with a sketch showing a verticle section of the apparatus.

Ans. As is shown on the cut, the double superheater Lowe carbureted water-gas apparatus is composed of three cylindrical vessels connected together in sequence. The shells of these vessels are made of wrought iron or steel plates and they are lined with fire clay blocks. An annular space from 1 inch to 1½ inches wide is left between the lining and the iron shell, and is filled with asbestos fibre or other fireproof non-conducting material, to diminish the radiation of heat from the shell.



Double Superheater Lowe Carbureted Water-Gas Apparatus—Vertical Section

The first vessel, A, is called the generator; the second, B, the carbureter or first superheater, and the third, C, the superheater, main superheater or fixing chamber.

The generator contains the fuel for heating up the apparatus and producing the water gas, and is provided with a grate and cleaning and clinkering doors,

at the grate level, and a charging door or doors on the top. It is usually connected from both the top and the bottom to the top of the carbureter, the pipe leading from the bottom, below the grate, running into that making the straight connection between the tops of the two vessels, as shown on the section. There is a valve in each connection, that in the top being cooled by having water circulating through it. The stems of these valves are connected to each other in such a way that when one is open the other must be closed. The object of this double connection between the generator and the carbureter is to make it possible to pass steam through the fire in the generator either from the bottom up or from the top down. During the "blows" (as the periods spent in heating up the apparatus by means of the air blast are called) the top valve is always open and the bottom one shut, while during the "runs" (as the gas making periods are called) either valve is left open, depending upon the desire to make either an up—or a down—run.

All the pipes connecting the different vessels are lined with fire clay tiles.

Construction of Carbureter

The carbureter is filled with a checker work of fire brick on edge, set with from 1½ in. to 2 in. clear space between the rows, and so that the rows break joint with each other. It is connected at the bottom to the superheater or fixing chamber, which is also filled with checker brick. On the top of the superheater is a take-off casting, the top of which opens to the atmosphere and the side to a pipe leading to a small cylindrical vessel called the washbox, which contains water in which the open end of the take-off pipe is sealed. The opening to the atmosphere can be closed by lowering a heavy iron lid, called the stack valve, which by its own weight forms a gas-tight joint with the face of the casting. When this lid is lowered, the only outlet from the superheater is through the take-off pipe and the washbox.

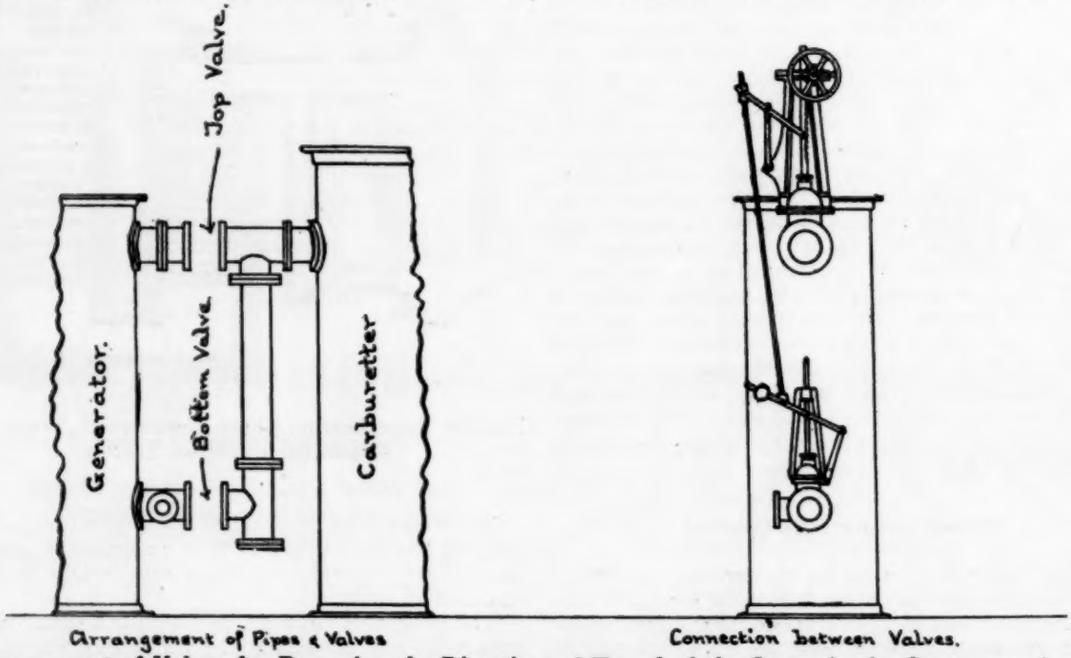
The generator has suitable air blast and steam connections, the carbureter air blast and oil connections, and the superheater air blast connections as shown on the cut. Large openings are provided in the sides of the carbureter and superheater through which the checker brick can be removed and replaced when necessary.

Arrangement for Passing Steam Through Fire in Generator

94. Give a description, illustrated with sketches, of some arrangement of valves by means of which steam can be passed through the fire in the generator of a carbureted water-gas apparatus, either from the bottom up or from the top down, as desired, and explain the advantage of being able to so reverse the direction of travel of the steam.

Ans. One arrangement of valves to enable the steam to be passed either upwards or downwards through the fire in the generator of a carbureted water-gas apparatus is illustrated on the accompanying cut. It consists of two valves, one in a horizontal pipe leading directly across from an opening in the side of the generator near its top to a corresponding opening in the side of the carbureter, and the other in the horizontal portion of a pipe leading from an opening in the side of the generator below the level of the grate bars to a connection with the upper pipe between the first valve and the carbureter.

(Eighteenth Installment Next Week)



Arrangement of Valves for Reversing the Direction of Travel of the Steam in the Generator of a Carbureted Water-Gas Apparatus

GAS MERCHANDISING

Domestic – Industrial

How We Developed Our High Rate of Gas Merchandise Sales*

Obtaining results by concerted effort

A. H. Sikes

Wisconsin Valley Electric Company

IN summing up the things which were responsible for our showing in the "Appliance Sales per Meter Contest," we can enumerate the following points:

Advertising

We believe that consistent advertising in the daily newspapers is very essential and think that a great deal of credit should be given this kind of advertising for our success. We plan our newspaper copy several months in advance and this has been a great advantage in putting our story across to our customers.

Direct Mail Advertising

Direct mail advertising is used to supplement our newspaper advertising and we mail pieces of literature at regular intervals during the year to a selected list of prospects. This list consists of prospects for gas service, water heaters and gas ranges.

Salesmen

We have two salesmen who call upon all customers regularly. We have divided the city into two territories and each salesman is expected to take care of his territory and follow up all leads which are given him from time to time outside of the regular prospects he finds for himself. All inquiries coming over telephone or through the office are turned over to the salesman in whose territory the prospect lives. The salesmen receive credit for all sales which they close within thirty days after the prospect has been turned over to them. They are paid a guarantee salary and a commission, provided their sales are equal to a certain specified amount. Besides salesmen, we have a saleslady who takes care of all sales at the office. Her work also includes mailing out literature and caring for the mailing lists.

*Presented before the Sales Section, Wisconsin Utilities Association, April 17-18, 1924.

Demonstrations

We have at least two gas range and two water heater demonstrations each year and at this time we put on a sale, advertising special terms. A special effort is made to have all prospects attend these demonstrations. The prospects who do not attend are called upon and an effort to close a sale is made.

Quality Merchandise

We sell nothing but the best quality of gas appliances and find that our customers will purchase the best if the merits of good merchandise are pointed out to them. To back up this statement, we refer you to our gas range sales for 1923, disclosing the following sales: Four $175 white enamel fireless gas ranges, five $160 white enamel fireless gas ranges, seventeen $125 white enamel fireless gas ranges, seven $80 cabinet gas ranges, seven $36 box over gas ranges, two three-burner cooker gas ranges, and two hotel gas ranges, making a total of fifty-four gas ranges. This goes to prove without a doubt that people are beginning to appreciate the value of purchasing high grade gas merchandise.

Service

This is the most important part of successful merchandising and we never call a sale closed until the customer is absolutely satisfied with the service his appliance is giving. After an appliance has been installed, one of our salesmen is required to call on the customer and see that everything is working properly and that the customer is entirely satisfied.

We believe that this covers our success in the showing we made in the contest sponsored by the American Gas Association.

Ideas of Interest to Those Who Sell

A few suggestions of value to the gas man

William H. Matlack

REAMS & CO., Lynchburg, Va., held a cooking school during the second week in March that drew many visitors to their store and aided gas range sales in that city materially. The demonstration was a practical one, held under direction of an experienced demonstrator. This demonstration was different from the demonstrations that have gone before in that copies of recipes were given all those in attendance who requested them, as well as covering a complete course in cookery, so to speak.

The range used during the demonstration was sold to the highest bidder, sealed bids being taken at each demonstration and all bidders listed as prospects for new ranges and turned over to salesmen to follow up.

Another company, and this time a gas company, that has plans laid out to conduct demonstrations in the South, is the Gas Light Company of Augusta, Augusta, Georgia. Here the gas company has planned to hold a demonstration two evenings each month, between the hours of 7:30 and 9. Each evening a member of the company's service department will demonstrate the preparation and cooking of one article of food. One evening will be given over entirely to bread and rolls, another to roast meat, another to broiled steak or fish. The idea is to hold attendance by announcing at each demonstration the thing to be demonstrated at the coming meeting and to have those in attendance advertise the fact to friends. Newspaper advertising is to announce the opening demonstration and as there is to be no special night during any week, all lectures and demonstrations will be announced in this way, through paid newspaper space. The company has used the open date idea for the reason that all demonstrations will be held on "off-nights," that is, nights when there are no other big blow-outs in town. This should help to pack the house.

Fill Up Your Envelopes

Some folks say it is not worth while to fill up all mail matter that leaves the store with a direct advertising. "When you send a man a statement or bill, or even a letter, he will not take time to read a leaflet that has been enclosed. He knows it's just a filler," said a man we know.

But we can't agree with him. We know from personal experience that folks do take time to read the direct mail advertising used as enclosures with bills, statements and letters. Not long ago, and upon the same day, we witnessed the placing of two orders for merchandise by two different men as the result of direct advertising. One of the orders was placed with a mail order stationery concern and was the result of the company enclosing a leaflet order blank with a letter requesting the names of users of personal stationery. The other was an order for a subscription to one of the best known women's magazines published. The latter order was placed because an enterprising news dealer had inserted an order blank in a magazine that our friend purchased from a street stand.

Folks read direct mail enclosures—all do not buy, to be sure, but many do, a worth-while number—and never intimate how they were interested, at the time of making purchase.

Results Are Obtained

There is no way in which such direct advertising can be traced as for results—yet results do accrue. Direct advertising will produce, and the big thing about it is that it will prove productive equally as well for the merchant in a city of 10,000 inhabitants as for the one who sells to a population of half a million.

Right now we know of a gas company who has taken on a new gas range that is an innovation and which sells for big money. This company has employed the direct way to shoot at prospects. It has a high class residential district to which it mails gas bills, while the bills to other customers in the congested area are passed. The April bills this company mailed contained a folder describing the new range. Here is a real test as the range has never before been displayed or advertised in this city. We hope later to be able to tell you what direct shooting does, how many inquiries this mailing secured and how many sales resulted.

That "Nothing Else" Habit

"There's nothing else today, is there?" is one phrase for which there is no excuse in selling. It kills all possible chance to "horn in" an additional suggestion or sale. How much better a fellow feels when a salesman approaches him with a smile and a "May I show you this new range or water heater?" or "Here is what you should have," after a sale has been made.

What's In a Title

A Western gas company found that by referring to its salesmen as "our service men" in letters to customers and in newspaper advertising that larger response was attained than where reference was made to our "salesmen" or our "solicitors." A Southern gas company has decided to use the words, "Sales Promotion Department" on salesmen's cards.

A Word on Good Will

In writing good will advertising, if the writer will use the power of suggestion, the task of creating favorable public opinion will not be a hard one, provided the man whose job it is to write the advertisements first saturates himself with a knowledge of good service. Good service is more than ample manufacturing facilities, extensive distribution systems, simplified credit systems and large organizations, for all of these things, and we might add low rates and a commodity that is above par, are of no avail if dispensed without a real willingness to be cheerful and of real service to folks.

Another Thing That Pays

When dealing with a customer or a prospective customer, it is a good idea to cast aside your hammer. "Running down" anybody's merchandise or anybody is not good work; especially so is fault finding with the boss, or making unkind or insinuating remarks about the company that employs you, bad acting. When a fellow has a grievance with the "house" he should go to the head of the house and get it off his chest. He can expect results from the boss; the customer or prospective customer can't help him iron out his difficulties.

ANALYZING GAS FOR CO CONTENT

(Continued from page 386)

well as the constant level bath are thoroughly washed. Then both the gas and water valves are shut.

Calculation of Results and Accuracy of Instrument

The next step is to solve the following fraction for each burette. This fraction is $\frac{V_1 - V_2}{V_0}$. The average of the three results is taken, as well as that of the temperatures which have been recorded.

As far as the accuracy of the instrument is concerned, it may be mentioned that certain French authorities have investigated the matter very thoroughly and have found that the accuracy is commensurate with all purposes for which it is or may be used. The errors have been reduced to an absolute minimum, so much so that it is not necessary for the analysis to be carried out by a trained chemist. A laboratory worker with the proper instruction and experience can easily learn how to operate the instrument and obtain accurate, reliable results with it.

The time that is taken in making the carbon monoxide determination by means of this instrument is a little greater than that used in making a calorimetric determination of the thermal quality of a gas by the aid of the Junker calorimeter. It will take a person who is not very skilled in making the analysis or in using this type of instrument a little more than an hour to make the analysis. A skilled operator can make the analysis in less than one hour.

WATERLESS GAS HOLDER MAKES ITS APPEARANCE IN U. S.

(Continued from page 388)

Method of Construction

The method of construction also will be different from anything ever before attempted in this country. After the foundation work is completed the roof and piston will be built. Then the piston and roof will be raised with compressed air as the side wall plates are put together. The workmen will use the piston as a working platform, while the roof will provide a shelter at all times. Both the roof and piston will be moved upward as the work on the side walls progresses.

On top of the roof will be a glass-inclosed inspection room or monitor, eight feet in diameter. Around the top of the holder, just below the roof, will be a band of wired glass about three feet in height. This will admit light to the top of the holder above the piston in case it becomes necessary for workmen to enter the holder to make repairs or adjustments at any time.

Gas will come into the holder from the bottom and push the piston up. An indicator on the side of the holder will enable plant engineers to tell the amount of gas in the holder at all times.

An iron stairway will lead from the ground to the roof and the monitor house and there will be three inspection galleries around the outside of the holder.

In this new type of holder a preparation of tar is used for sealing purposes around the piston, which, it is claimed, is not affected by cold weather.

THE KITCHEN BEAUTIFUL

We have seen campaigns for the city beautiful, the home beautiful and the flapper beautiful. The next on the program is for the kitchen beautiful. The field is fertile, it is almost virgin territory, and schools of interior decoration are beginning to apply themselves seriously to "beautifying the galley."

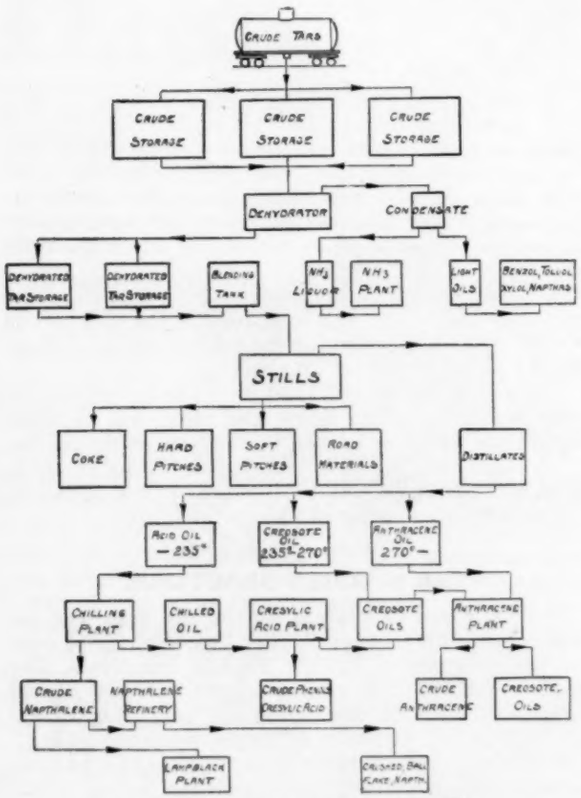
The widespread, almost universal, use of gas for cooking has practically added another "living room" to the home. Instead of the hot, stuffy, smoke-filled kitchen of our grandmothers, inevitably dirty with cinders, ashes and soot, we now have light, cool, cheery places where Mrs. Brownsmith-Jones can bring the week's best seller or her knitting or even her friends while the roast is cooking and the beans are boiling in the pot.

Housekeeping not only has lost one of its age-old terrors; it has gained an additional attraction. Look at the advertisements in the magazines. Gayly-colored cretonnes for the kitchen windows, attractive linoleums for the kitchen floor that would bring credit to many a parlor, kitchen furniture that is a miracle of the cabinet-maker's art. These are only a few. In addition, many families are forming the habit of serving breakfast in the kitchen. Special sets of furniture are made for this purpose with glistening white enamel top and attractive cane-seated chairs. It is merely another of the many triumphs of gas.

THE TAR INDUSTRY

(Continued from page 392)

3. Binder.
   A hot application for penetration and sealing work in tar macadam construction of new roads.
4. Paving Pitch.
   A soft ptich for cementing wood block pavements.



TAR REFINERY FLOW SHEET

5. Hot Patch.
   A soft binder for semi-permanent repairs requiring heating before being used.
6. Cold Patch.
   A volatile blend of binder and light distillates for general road patching purposes.

Felt Saturant

The National Board of Fire Underwriters require tar which is used as a saturant for roofing felt to "be a refined coal tar from which all water has been distilled" and "it is recommended that the saturant have a flash point above 66 deg. C." The crude felt, which is a mixture of paper and rag stock and resembles huge rolls of newspaper, is run through heated vats of refined tar, pressed between hot rolls and stood on end for drying. A good grade of high rag stock felt will absorb from 150 to 200 per cent by weight of saturant. The finished product must be thoroughly saturated, show no dry spots, be free from stickiness, pliable at ordinary temperatures, be of uniform thickness and free from holes, breaks and other imperfections and "must average not less than 13½ pounds per 100 square feet."

Paints and Varnishes

The value of tar, even in its crude form, as a wood and metal preservative, has long been recognized. The refined tar paints are made by cutting back pitches with solvents and differ from linseed oil paints in that they dry by evaporation and not by oxidation. The harder the pitch and the more volatile the solvent, the quicker the paint will dry. For wood paints, low carbon pitches are preferable as the carbon has a tendency to fill the surface pores of the wood and prevent deep penetration. For metal paints low carbon pitch gives a bright gloss for cold surfaces, but is not as satisfactory for hot surfaces as a high carbon. For stacks and other very hot work it is customary to use a hard, high carbon pitch, with the addition of lamp black or finely divided graphite and a high boiling oil as a carrying agent.

A very excellent resin for varnish manufacture is obtained from the high boiling naphthas and heavy benzols of coal tar. These oils contain varying amounts of coumarone and indene which are polymerized by treating with concentrated sulphuric acid, then washed with caustic and water and distilled. The residual material is paracoumarone or coumarone resin, used in the varnish, paper, electrical and other industries.

Pitches

Pitches comprise the more bulky solid products of tar distillation—the harder the pitch, the greater the oil yield. There are hundreds of grades of pitches varying in quality and degree of hardness according to the purposes for which they are used.

Pitch which is obtained by coking may be used for fuel and for electrical molding and insulators. Thousands of tons of pitch with a melting point of about 80 deg. C. are being exported to the Ruhr Valley for use in briqueting low grades of fuel for use in the French locomotives. A somewhat softer pitch is used in the optical industry to hold lens glasses during the grinding process. Pitch of a melting point from 65 deg. C. to 70 deg. C. is mixed with a viscous high carbon tar and used in concrete walk manufacture.

The bulk of the pitch manufactured is used in the preparation of the familiar tar and gravel roofs.

Conclusion

For years the development of the gas industry was held back by the secret and suspicious attitude of those engaged in it. Only when organizations similar to this were formed, where theories and prac-

tices might be freely and openly discussed, where men might meet on a common basis and profit by the ideas, the experiences and even the mistakes of the other fellow, did the industry forge ahead.

The writer has done nothing more than scratch the surface of the coal tar industry. Its ramification would take volume after volume and a single individual could hardly keep pace in writing with its development from day to day. If you, gas men and producers of tar, have obtained a single thought or idea which will enable or induce you to make a better grade of material than you are now producing, both yourselves and the refiner will profit by it. And, if you have learned nothing whatever about the tar industry, except that it is not a mysterious, secret, soulless business, but one deeply interested in your affairs, and one which asks your reciprocal interest and understanding in it, the writer will feel well repaid for his endeavors.

(This paper is of considerable length in the original. It has been largely abstracted. The original will be found in the proceedings of the New England Association of Gas Engineers.—Ed.)

MOISTURE IN GAS

The determination of the portion of moisture in gas is a complicated affair when carried out by means of a calcium chloride apparatus. On the other hand, the psychrometric method is rapid, but when the thernometer is inserted in the stream of gas, due to the fact that the latter contains tar and dust, the thernometer tube becomes soiled and it becomes extremely difficult to make a reading of the temperature.

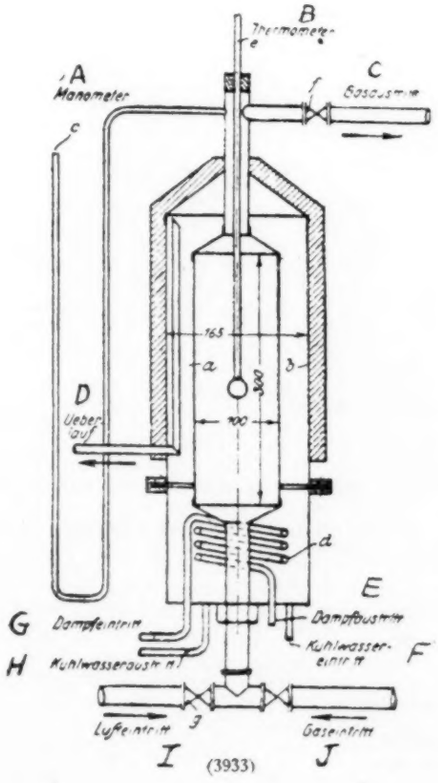
The figure shows construction of an apparatus invented by Nagel, which is described in the German Magazine Feuerungs Technik, Vol. 11, pages 27 and 28.

In this apparatus A is a manometer, B is a thernometer. The gas leaves the apparatus through the tube C. D is an overflow tube. E is an outlet for steam. F is an inlet for cooling water. G is an inlet for steam, while H is an outlet for the cooling water. I is an air inlet and J is the gas inlet.

The space between the two condensers which are seen in the figure is filled with water which is heated by the steam coil d. The water is heated to a temperature read off on a thernometer which is above the supposed dewpoint. For a certain period of time a current of gas is sent through the apparatus, then the inlet and outlet valves are closed. At this point the temperature T, pressure P of the gas are read, then the gas is heated up to the highest possible temperature and the corresponding readings T_1 and P_1 are made.

The heating is continued in order to vaporize any small traces of water that still remain. Then cold water is introduced into the apparatus until a temperature T lower than the dewpoint is obtained. Corresponding pressure P is also obtained. T, T_1 and T_2 denote the absolute temperatures; P, P_1 and P_2 the absolute pressure; e, e_1 and e_2 the partial pressure of the water vapor at temperatures T, T_1 and T_2; p, p_1 and p_2 denote partial pressure of the gas at the temperatures, T, T_1 and T_2. From this we have the following equation:

$$\frac{P_1 - e}{P_2 - e} = \frac{T_1}{T_2}$$



The content of water vapor and percentage volume can then be obtained from the following equation:

$$100\frac{e_1}{P_1} = 100\frac{T_1}{T_2}\,\frac{P_2 - e_2}{P_1}$$

In this equation e_2 is the maximum tension of separated water vapor at temperature T_2.

In the article original graphs are given which enable the percentages of moisture in the gas to be quickly obtained.

Current Market Prices

COALS (By Courtesy of Coal Age)

A. Bituminous.

(Spot prices, F. O. B., mines, net tons).

High Volatile, Eastern	Market	Price
Pool 54-64 (Gas Standard))	New York	$1.35 to $1.60
Pittsburgh screened gas	Pittsburgh	2.30 to 2.50
Pittsburgh gas, mine run	Pittsburgh	2.00 to 2.25
Kanawha lump	Columbus	(*)
Kanawha mine run	Columbus	(*)
West Virginia lump	Cincinnati	2.00 to 2.50
W. Virginia gas mine run	Cincinnati	1.15 to 1.50
Midwest		
Indiana 4th vein lump	Chicago	2.75 to 3.00
Indiana 4th vein mine run	Chicago	2.25 to 2.50
South and Southwest		
Big Seam lump	Birmingham	2.50 to 2.75
Big Seam mine run	Birmingham	1.75 to 2.25
Southeast Kentucky lump	Louisville	2.25 to 2.50
Southeast Kentucky mine run	Louisville	1.25 to 1.75

B. Anthracite.

(Spot prices F. O. B. mines, gross tons),

Market	Freight rates	Independent	Company
Egg New York	$2.34	$8.25 to $8.65	$8.25 to $8.65
Egg Philadelphia	2.39	8.25 to 9.40	8.60 to 8.65
Egg Chicago (net tons)	5.06	7.59 to 7.81	7.65 to 7.72

COKE (By Courtesy of Iron Trade Review).

Connellsville, furnace	$3.60 to $4.00
Wise County, furnace	4.25 to 5.50
Alabama, furnace	5.00 to 6.00
Foundry, Newark, N. J., del.	10.41
Foundry, Chicago, ovens	12.50
Foundry, Boston, delivered	12.50
Foundry, St. Louis	12.50
Foundry, Granite City, Ill.	12.50
Foundry, Alabama	5.00 to 6.50

PETROLEUM (By Courtesy of Oil, Paint & Drug Reporter)

(Prices at wells, per bbl.)

Pennsylvania—Ohio—West Virginia.	
Cabell, West Virginia	$2.20
Corning, Ohio	2.15
Lima	2.28
Pennsylvania	4.00 to 4.50
Wooster, Ohio	2.15
Indiana—Illinois.	
Illinois	2.07
Indiana	2.08
Oklahoma—Kansas.	
Healdton	.90
Mid-continent (low gravity)	1.25

* No quotation, due to strike.

Gulf Coast.

Gulf Coast, Grade A	$2.00
Gulf Coast, Grade B	1.70

GAS OILS.

Gas Oil, Bayonne, bulk gal.	5½c
Gas Oil (32-36) Illinois-Indiana,	5.38 to 5.63
Gas Oil (32-36) Oklahoma, gal.	3 to 3½c
Gas Oil (32-36) Gulf Coast, gal	5 to 5½c

PIPE AND FITTINGS—CAST IRON GAS PIPE.

(By Courtesy Iron Trade Review.)

Four-inch, Chicago	$66.20 to $67.20
Six-inch and over, Chicago	62.20 to 63.20
Four-inch, Birmingham	57.00 to 58.00
Six-inch and over, Birmingham	53.00 to 54.00
Four-inch, New York	70.60 to 71.60
Six-inch and over, New York	65.60 to 66.60
Standard fittings, Birmingham, base	115.00

6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20.

BY-PRODUCTS

(By Courtesy of Oil, Paint and Drug Reporter)

Ammonia aqua, 16 deg. drums lb.	5 to 5¼c
Ammonia aqua, 20 deg. drums lb.	6¼ to 6½c
Ammonia squa, 26 deg. drums lb.	6¾ to 7 c
Ammonia squa, anhydrous cylinder, lb.	30 to 36 c
Ammonium sulphate, bulk F. O. B. Works, per 100 lbs.	$2.70 to $2.75
Potash prussiate, yellow casks, lb.	18 to 19 c
Potash prussiate, red casks, lb.	38 to 40 c
Soda prussiate, yellow casks, lb.	10 to 10¼c
Soda sulphocyanide, barrels, lb.	45 to 55 c

COAL TAR BASIC PRODUCTS.

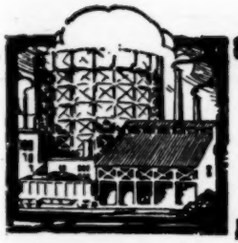
(By Courtesy of Oil, Paint and Drug Reporter)

Benzol C. P. tanks, works, gal.	25 to 30c
Benzol, drums, gal.	30 to 35c
Benzol, 90% tanks, works, gal.	23 to 28c
Benzol, 90% drums, gal.	28 to 33c
Napthalene, flake, barrels, lb.	5½ to 6c
Napthalene, crushed bags, lb.	5½ to 6c
Solvent Naphtha, water white works, gal.	28c
Solvent Naphtha, drums, works, gal.	33c
Solvent Naptha, Crude Tanks, works, gal.	25c
Solvent Naphtha, drums, works, gal.	30c
Toluene, C. P. tanks, works, gal.	31c
Toluene C. P. drums, works, gal.	36c

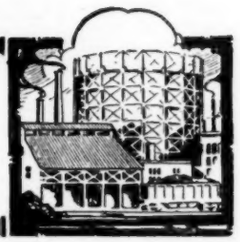
Inactivity is the prevailing condition in the coal markets of the country. From week to week there is little noticeable change either in demand or price, the general tendency being downward. The condition of the market is rather strikingly indicated by the bids received April 18 by the U. S. Shipping Board at New York for 1,065 gross tons of bituminous coal of either Pool 9 or 71 quality, the quotations ranging on a f. o. b. mine basis as low as $1.03 per net ton.

Production of bituminous coal took a further drop of 84,000 tons during the week ended April 12, when 6,742,000 net tons was produced, according to the Geological Survey. Anthracite output was 1,856,000 net tons, an increase of 308,000 tons over the preceding week.

Gas oil attracted a little more export attention locally, prices holding steady at 5½c to 6c per gallon. Oklahoma and Kansas gas oil showed a drop of ⅛c per gallon, while North Texas was also ⅛c off on 32-36, prices on 36-38 remaining steady. Gulf Coast gas oil was stronger at 5c to 5½c.



NEWS OF THE GAS INDUSTRY



Wisconsin Gas Men Meet---Many Interesting Papers Are Read

The annual meeting of the Wisconsin Utilities Association was held in Milwaukee, Wis., April 17-18, 1924. The Wisconsin Gas Association is a member of the Utilities Association.

The meeting was well attended and several important papers were read. The new officers of the association are as follows:

President of the entire association, G. C. Neff, Madison; vice-president, L. L. Tessier, Depere; treasurer, Harrison A. Smith, Madison; chairman gas section, J. G. Felton, Lacrosse; vice-chairman, I. F. Wortendyke, Janesville; chairman sales section, W. R. Lacey, Milwaukee; chairman accounting section, L. H. Boutell, Madison.

Gas Sales Increasing in Wisconsin

The steadily increasing gas sales in Wisconsin indicate that the family cooking and the family baking still is the central force that holds the home together, all assaults of modernism notwithstanding. This is the opinion of A. F. Davey, of Sheboygan, chairman of the manufactured gas section.

Mr. Davey in his address showed that the per family sales of gas in Wisconsin nearly doubled in ten years.

He declared:

"The records obtained from the railroad commission show that gas sales per home in Wisconsin are steadily increasing. In 1913 Wisconsin gas companies sold 5,050,000,000 cubic feet of gas, while in 1923 they sold 9,663,849,000 cubic feet. This is an increase in ten years of 91 per cent.

"The number of customers increased in the ten-year period from 155,000 to 241,600, a growth of 56 per cent. This greater gain in the sale of gas over the increase in the number of customers is a most desirable condition, because it signifies increased use of gas per customer, and that means no corresponding increase in customer's service costs.

"As a result of this desirable phase of the growth of the gas business and the increased efficiency of gas manufacture, the average rate to customers shows a decrease in the last ten years of 16 per cent. When it is considered that during this same period materials and labor costs increased at least three-fold, the gas industry can be justly proud of its record. Few businesses other than the utility industry can show as good a record.

Gas Industry Facing Brightest Future

"The gas industry is facing its brightest future, not only in increasing uses of gas in the home, but for new uses in industries. Because of its cleanliness, convenience, flexibility of heat control and dependability, gas has no real competitor.

"That the public is realizing that the industry is on the threshold of its greatest development in history is demonstrated by the rapidity with which people are purchasing securities of gas companies. Only a few weeks ago, the Milwaukee Gas Light Company disposed of a million dollar issue of preferred stock in one day, despite the fact that it limited each purchaser to thirty shares.

"Among the new industrial uses is the enameling of steel or iron, gold refining, refrigeration, ice cream cone baking, meat smoking, coffee roasting, cooperage, photo engraving, die casting and brick making."

All Wisconsin Utilities in Good Shape

Business for public utilities in Wisconsin will be just as good in 1924 as it was in 1923, and even just a bit better. This prediction is based not on mere assumption. Its basis is so solid that these same public utilities in Wisconsin are willing to spend an aggregate sum of $26,769,179 to meet it.

This revelation was made by Harold L. Geisse, president of the Wisconsin Utilities Assoociation, who submitted tabulations at the association's convention. The above sum, Mr. Geisse said, will be spent by big Wisconsin gas, electric, street railway and telephone companies in a program of building and improvements already under way.

Some of the larger building and improvement items involving construction of new plants, dams, gas holders and mains, listed for 1924, are:

Milwaukee Gas Light Company, $1,197,000—New gas storage holder, boilers, stokers, liquid purification plant, office building additions,

Gas Sales Association of N. E. April Meeting Listens to Discourse on Taxes

At the April meeting of the Gas Sales Association of New England, held on Friday, April 11, in Boston, the members were addressed by Hon. Henry F. Long, Commissioner of Taxation for the Commonwealth of Massachusetts.

The 155 members present were particularly fortunate in having the subject of "taxes" presented to them in such an interesting way.

Mr. Long said, in part:

"The gas companies in Massachusetts are prospering, and as they prosper the Commonwealth of Massachusetts gains in revenue. I know this is true, because I see

the gas companies' tax returns and they are surely progressing.

"Taxes have been laid upon the people since the dawn of civilization. Taxes have been troublesome. There has never been a time in the history of the world but what taxes were necessary. Taxes were laid in the early days upon those people who seemed to have more of the valuable things than the others; they took from those who had the most for the benefit of the whole community. Bear in mind, the fundamental form of taxes has come to us from the very earliest days—taking from the person in accordance with his ability to pay.

History of Taxes

"The earliest form of taxes was in the City of Tyre. This city was the power of the world. It obtained its money by loading all kinds of taxes into the goods sold. Later the City of Carthage did the same way and the City of Rome used the system of seizure, taking away from those who had for the benefit of the people.

"In the early days people did not have the say how much should be taken away from them. In those days kings exacted taxes from the people according to their desires.

"We here in America have the right to say how much shall be taken away from us; this is done by the election of Senators and Representatives and other Government officials.

"There has never been a time when taxes were not a burden upon the people. Everything the Government does is an expense to the people. The real problem is to give the people the things which the Government does, such as protection, schools, etc., and accept nothing for them.

"When our people first landed in this country, there was no great demand for taxes. We didn't have schools, roads, bridges, etc., which required money to build and to operate. However, some money was needed, so they levied a tax on those things of value. It is well to think that we have carried that idea down to the present day.

"Eighty per cent of all the money raised from taxes is raised on land and buildings, the things that you can see, 79 per cent of that 80 per cent is expended locally.

"In the early days we went along and all we needed could be readily taken from the people. So for many years it was a law that one-third of all the money spent for Government activities should be collected in the form of a head tax. The theory was that Government was organized for the people, therefore, all the people should contribute towards it.

"We went along through those early days placing taxes on land and buildings and a head tax. We went through the Civil War and did not have much trouble with the financing. We put on a few taxes but they were not important.

New Kinds of Property Developed

"During the past forty years there has grown into the community a different kind of property, which cannot be reached by the simple process used in those early colonial days.

"In those days there were no such things as stock certificates, gas corporations, etc. There has developed out of that the no longer simple form of taxes.

"It is now necessary to frame laws which apply to a man who is engaged in a great many lines of business.

"Bear in mind that we are trying to find out all of the time the ability of the man to pay. This is a very old principle—taking from the person in accordance with his ability to pay.

Taxes on Gas Companies

"We have, of course, in Massachusetts, taxes on gas companies. A gas company pays first a tax to the Federal Government upon its income and upon its capital stock. This money is spent largely by the Federal Government for wars, past, present and future—some 92 per cent is spent in this way. Gas companies pay 12½ per cent upon their income.

"You don't see what becomes of these taxes.

"Gas companies pay a tax on their franchise on the principle that they are given a right to do business by the government."

At this point Mr. Long gave figures to show just how every dollar received was expended.

He stated that he wished that the tax bills could be sent to the people the same as gas company bills. When a person gets a tax bill covering a whole year it seems a great burden to him, but if he received this bill in twelve installments it probably would have a different effect on him.

Steel Treating Exhibition

Mr. P. J. Lafore told about the steel treating exhibition to be held at Commonwealth Pier in September. He urged the gas industry to be a part of this exhibition. A committee was appointed to look into this matter.

Advertising

Mr. C. T. Aaron presented a plan to the association for co-operating advertising. This plan is to have full page advertisements in the Boston papers, instructing the people about gas and its uses. The expense of this advertising to be pro rated among the gas companies in accordance with the number of meters, the distance of the town from Boston and the circulation of the paper in that town.

It was the opinion of the association that something of the nature should be done, and a committee was appointed to investigate and make report.

Gas Company Solves the Problem

The Allied Council of Improvement Association, Denver, Col., was fearful that the dam as used by the Public Service Company's plant on the Platte River at Thirteenth street would in the time of high water cause an overflow which would wreck that part of the city.

H. H. Kerr and John E. Field, engineers for the company, designed a dam with a base in the river, so constructed that the whole dam might be sunk below the water and permit not only the water, but all sand and brush to pass. They styled it the "collapsible dam," and such it is.

Gas Co. Wants to Issue Stock

The Utah Gas & Coke Co. has called a meeting of its stockholders for April 17, at which time there will be a vote taken as to whether or not the company may be permitted to issue 7 per cent participating stock with which to pay accrued dividends on the present 7 per cent stock.

Glover-West Plant to Be Extended at Vancouver, B. C.

The British Columbia Electric Railway Company has placed a further contract with the West Gas Improvement Company for Glover-West vertical retort plant. The new plant will have a capacity of about 2,500,000 cu. ft. per day, which will bring the total daily output of the continuous carbonization system there up to 3,500,000 cu. ft.

The first million foot plant was completed in December, 1921, and at the same time an installation of 750,000 feet per day commenced gas making at Victoria, B. C., which plant is also operated by the British Columbia Electric Railway Company.

Both plants have been giving all round good results, and those of our readers who were at the last Canadian Gas Association meeting will remember that the Victoria plant formed the subject of an eulogistic paper by Mr. F. H. Hewlings of Victoria.

Mr. John Keillor, manager of the Vancouver undertaking, has recently returned from England, where he inspected the latest model of the Glover-West retort, which has been designed to take full advantage of the practice of steaming, and this latest development of the system is to be installed in the new extension. Waste heat boilers will also be provided from which sufficient steam will be generated to steam the retorts to such an extent as to reduce the calorific value of the gas to 450 B. T. U. per cu. ft., providing at the same time an excess for general works purposes.

Public Service Boys Entertain New York Officials

Denver, Col.—April 1 may be April Fool day for some folks, but it was a glorious evening for M. R. Bump, chief engineer of the Cities Service, and Paul R. Jones, the chief auditor, both of New York. Messrs. Bump and Jones were in Denver on business and the H. L. Doherty organization, about 125 strong, entertained the New Yorkers at a banquet at the Brown Palace Hotel on the evening of April 1. The saxophone band and orchestra of the Public Service Company provided the music and it is said that the tune which was received with the most applause was:

"The Best There Is, Is G-A-S."

Malaga Turns to Gas Heat

Malaga, home of Muscatel wines and the Malaga grape, land of perpetual sunshine and summer, is buying warmth by the thousand cubic feet, according to recent advices from Spain. To any one who has ever been there, this particular commodity would be the last one that would ever offer for sale in that old Andalusian seaport. Yet, strangely enough, it is not a case of "carrying coals to Newcastle."

For, although heating apparatus is not absolutely necessary in Malaga, even during the winter months, its use is certainly desirable. The houses are constructed with thick walls, which resist the heat of the hot summer months, but hold and appear to augment the dampness caused by heavy winter rains.

Gas Exhibition in London

The gas exhibit, which occupies ground directly in front of the Palace of Industry, covers an area of approximately 13,000 square feet. Altogether, no less than seven and one-half miles of gas mains have been laid in the exhibition area. A 12-inch main runs all around it, with 10-inch and 8-inch connections from it.

The lighting of the vast amusement parks and the avenues through it will also be by gas, furnished by the local gas company, which is installing about 5,000 low pressure burners. In addition, Lyons & Co., the famous London caterers, who will have charge of the cooking arrangements, are preparing to use gas exclusively.

President of Coal Company Admits Gas Is Better Fuel

"The only true remedy for the high price of anthracite lies in competition outside the industry, by the use of substitutes, as the United States Coal Commission has pointed out," declares Harry Wharton, president of the Montrose Pocahontas Coal Company.

"Through the development in the art of manufacturing gas the solution of community heating is probably close at hand; i. e., in the distribution from central plants of heat in the form of gas, thereby also providing a large quantity of coke suitable for domestic use, releasing a corresponding quantity of raw fuel for use in places beyond the reach of central gas plants. Thus a material saving would be effected in our natural resources.

"The convenience of gas as a fuel is obvious; it is clean and eliminates storage in the home. Furthermore, the distillation of coal into gas yields a variety of invaluable by-products besides coke; i. e., ammonia, for fertilizer and many other purposes; tar, for road construction, roofing, etc.; benzol, largely used as a substitute for gasoline, and so forth.

"Apropos of central plants supplying community gas for domestic purposes, I would suggest that existing public utilities, the public service corporations, should be encouraged in every proper way. A reasonable B. T. U. (British thermal unit) standard for domestic consumption should be arrived at and adopted. For many years the British thermal unit basis in the measuring of manufactured gas was fought bitterly by both city and state authorities. It has only been recently accepted, although the candle power basis of measurement has been obsolete since the incandescent mantle came into general use in gas lighting. The British thermal unit standard adopted should be one that will enable fuel gas to be sold at the lowest price consistent with the most efficient results in its use for domestic purposes. A higher British thermal unit gas than will do the work of the consumer will not benefit him in the least. On the contrary, it means a higher price for gas and a waste of raw material."

Gas Schedules Approved by Public Service Commission

Albany, N. Y. — Adirondack Power & Light Corporation. Gas service supplied to city of Schenectady, village of Scotia and towns of Glenville, Niskayuna and Rotterdam, N. Y. Schedule filed to become effective April 1, 1924, provides rate (per M. cu. ft.) as follows, for general use of service by

all customers: First 1,000 cu. ft., $1.40; next 4,000 cu. ft., $1.35; next 15,000 cu. ft., $1.30; next 30,000 cu. ft., $1.20; next 50,000 cu. ft., $1.10. All over 100,000 cu. ft. per month, $1. Minimum charge, 5 cents per month. Discount for prompt payment, 10 cents per M. cu. ft. Rates heretofore in effect: First 50,000 cu. ft., $1.40; next 50,000 cu. ft., $1.20; all over 100,000 cu. ft. per month, $1. Minimum charge, 50 cents per month. Discount for prompt payment, 10 cents per M. cu. ft.

Syracuse Lighting Company, Inc.—Gas service supplied in city of Syracuse, villages of Eastwood and Solvay, and towns of DeWitt, Onondaga and Salina, N. Y. Schedule filed to become effective April 1, 1924, provides rate (per M. cu. ft.) as follows for use of service for light, heat and power: First 20,000 cu. ft., $1.13; next 80,000 cu. ft., $1.05; next 200,000 cu. ft., 85 cents; next 700,000 cu. ft., 80 cents; next 1,000,000 cu. ft., 75 cents; next 1,000,000 cu. ft., 70 cents; all over 3,000,000 cu. ft. per month, 65 cents. Minimum charge, 50 cents per month. If bills are not paid within 10 days after rendition, 5 per cent will be added to the minimum charge, also to that portion billed at $1.13 per M. cu. ft. Rates heretofore in effect: First, 50,000 cu. ft., $1.13; next 950,000 cu. ft., $1.05; all over 1,000,000 cu. ft. per month, 95 cents. Minimum charge and terms of payment same as above.

Philadelphia Gas and Electric to Build New Holder

Pottstown, Pa. — Preliminary work has been started for the Philadelphia Gas and Electric Company for the construction of a new gas container in connection with its plant here. In addition, other changes are contemplated, which, when completed, will represent an investment of from $15,000 to $175,000 in Pottstown.

The company has felt the need for additional equipment of this character for some time. The new container will double the capacity for gas service, and in addition to providing ample supply for the increasing needs will act as a check against interference with supply in case of accident.

The other contemplated changes embrace improvements to existing equipment at the gas plant, to keep pace with modern demands.

Form Advertising Club at Utica, N. Y.

With a charter membership of fifty-five advertising and other business executives, the Advertising Club of Utica was formed at that city last week. Before the charter list is closed an organization of 200 is anticipated.

William J. Reagan, commercial manager of the Utica Gas & Electric Company, was elected president. Other officers chosen were: Vice-president, Robert D. Fraser; vice-president Robert Fraser, Inc.; secretary, Cornelius J. Quinlivan, advertising manager Utica City National Bank, and treasurer, Homer G. Buckley, advertising manager Foster Brothers' Manufacturing Company.

Removal Notice

Quigley Furnace Specialties Company, Chicago office, will be moved to larger quarters on May 1, at 9 So. Clinton street.

B. H. Gardner Appointed Assistant to Vice-President of Northern Indiana Gas & Electric Co.

B. H. Gardner, for the past three years manager of the Lafayette district of the Northern Indiana Gas & Electric Company, has been appointed assistant to Vice-President Morse, Dell Plain, with headquarters at Hammond, Ind. He will assume his new duties early this month.

Mr. Gardner is a native of South Carolina and has been in the public utility business since he was graduated in electrical engineering from Clemson College in that state. After finishing school, he spent two and one-half years with the General Electric Company at Schenectady, N. Y. He then went to the Dayton Power & Light Company of Dayton, Ohio, where he spent six years, starting as power engineer and later becoming sales manager of the company.

From there he went to the Connecticut Light & Power Company at Waterbury, Conn., as power engineer. Later he became superintendent of the Norwalk district for that company and later was made superintendent of the New Britain district. From there he was transferred to the main office of the company at Waterbury and was placed in charge of all sales work, rate matters and public relations. After ten years with the Connecticut Light & Power Company he came west in February, 1921, as manager of the Lafayette district of the Northern Indiana Gas & Electric Company.

Mr. Gardner will be succeeded at Lafayette by William Insull, who has been manager of the Connersville, Ind., district of the Interstate Public Service Company.

Stacey Mfg. Co. Officers Re-elected

At the annual meeting of the stockholders of the Stacey Manufacturing Company, held at the office of the company at Elwood Place, Ohio, on April 14, the following officers were re-elected: J. Frank Stacey, president and general manager; Thos. C. Ranshaw, vice-president, and Edw. J. Baechle, secretary and treasurer. Reports indicate that the company has enjoyed one of its most prosperous years.

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The British Columbia Electric Railway Company has placed a further contract with the West Gas Improvement Company, New York, for a Glover-West vertical retort plant.

The new plant will have a capacity of about 2,500,000 cu. ft. per day, which, together with the first installation completed in December, 1921, will bring the total daily output of both batteries up to 3,500,000 cu. ft.

Merger of Kansas Gas Companies

The Illinois Power & Light Corporation, with headquarters here, announced April 3 that numerous public utility properties in Kansas have been merged under the control of one company to be known as the Kansas Public Service Company, though all the companies merged are owned by the Illinois concern. Officers of the new company are: President, Clement Studebaker, Jr.; vice-presidents, William A. Baehr and H. L. Hanley; vice-president and secretary, Scott Brown; treasurer, George M. Mattis; clerk, Edward Woodman